Rapid Watershed Assessment
Resource Profile
Buffalo Watershed (MN) HUC: 09020106

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land–owners and local leaders set priorities and determine the best actions to achieve their goals.

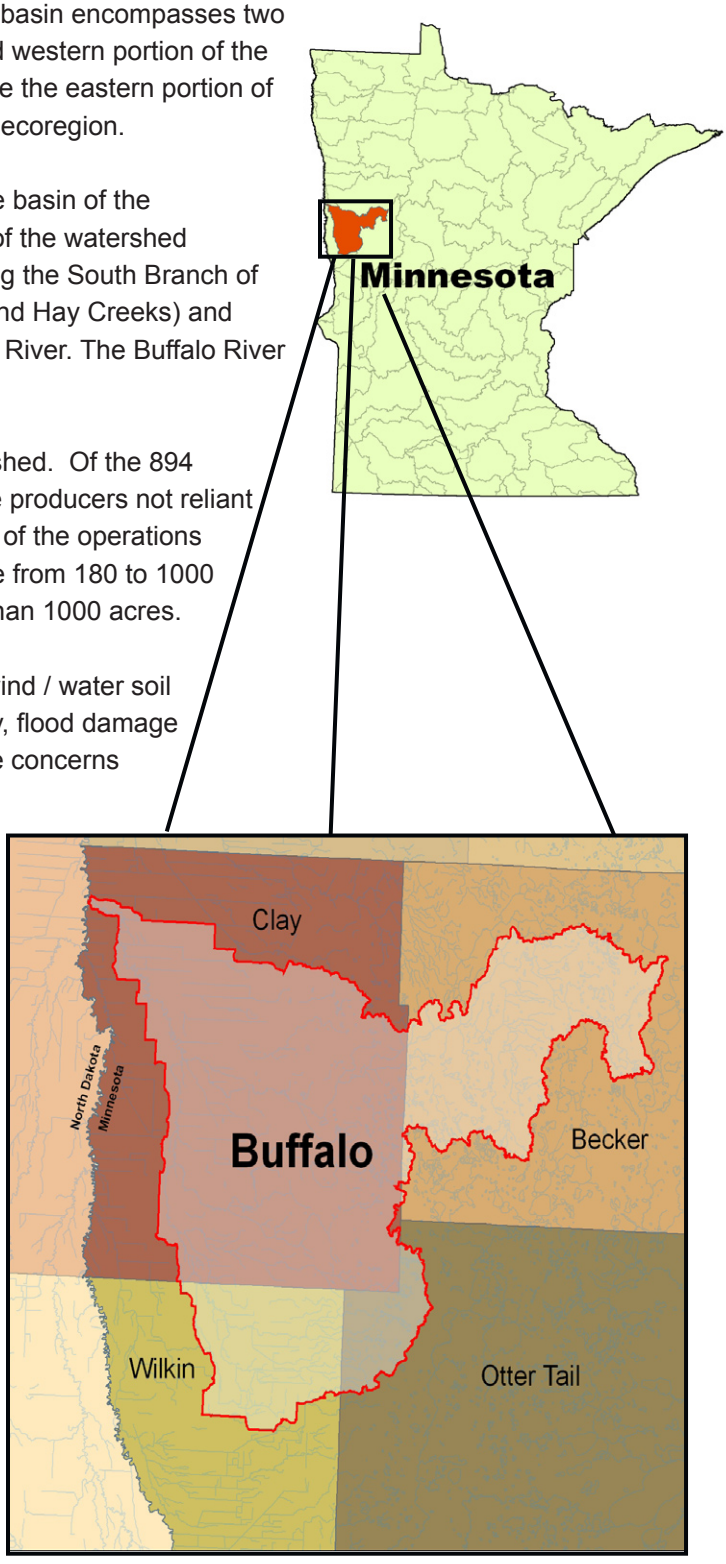
Introduction

The Buffalo 8-Digit Hydrologic Unit Code (HUC) subbasin encompasses two different ecoregions of Minnesota. The southern and western portion of the watershed lie in the Red River Valley ecoregion while the eastern portion of the basin lies in the North Central Hardwood Forest ecoregion.

The Buffalo River Watershed serves as the drainage basin of the headwaters of the Red River. The major tributaries of the watershed include the Buffalo River (and its tributaries, including the South Branch of the Buffalo River; and Whiskey, Deerhorn, Stoney and Hay Creeks) and Wolverton Creek -- both direct tributaries to the Red River. The Buffalo River originates in Tamarac Lake in Becker County.

Estimates indicate there are 923 farms in the watershed. Of the 894 operators in the basin, sixty two percent are full time producers not reliant on off-farm income. Approximately forty two percent of the operations are less than 180 acres in size, forty five percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres.

The main resource concerns in the watershed are wind / water soil erosion, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to landuse and development in the region, resulting in fragmentation and increased sediment and pollutant (mercury, excess nutrients) loadings to surface waters.



County Totals

County	*Acres in HUC*	*% HUC*
Clay	406,293	57.3%
Becker	173,164	24.4%
Otter Tail	38,851	5.5%
Wilkin	91,092	12.8%
Total acres:	**709,400**	**100%**

Physical Description

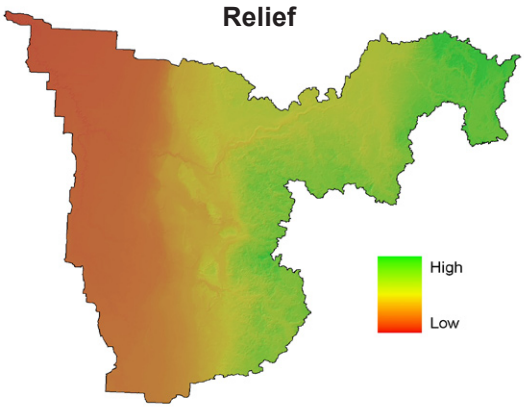
Average elevation in the Buffalo subbasin is 1,130 feet above sea level. The highest values are found in the Northeastern and Eastern portions of the watershed, while increasingly lower values are found across the central and northwestern regions.

Precipitation in the watershed ranges from 21 to 25 inches annually. Since much of the watershed lies in the Red River Valley, it is prone to flooding. According to the Minnesota Pollution Control Agency, annual average flood damage (in 1996 dollars) in the watershed is estimated at $2,705,710 and is 99.5% rural damage. The watershed suffers 13.6% of flood damages occurring in the Red River Basin, outside of damages occurring along the main stem of the Red River.

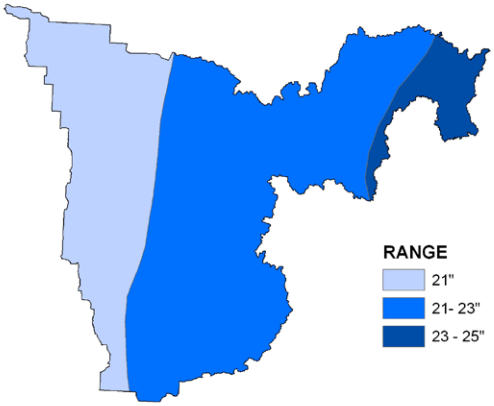
Predominate land uses / land covers are Row Crops (66.6%), Grass/Pasture/Hay (9.3%), Forest (8.8%), Wetlands (6.8%), and Residential/Commercial Development (4.8%). Land use within the watershed is largely agricultural, accounting for over 70% of the overall watershed acres.

Development pressure is moderate to considerable in some areas, with occasional farms, timberland, and lakeshore being parceled out for recreation, lake or country homes.

Relief

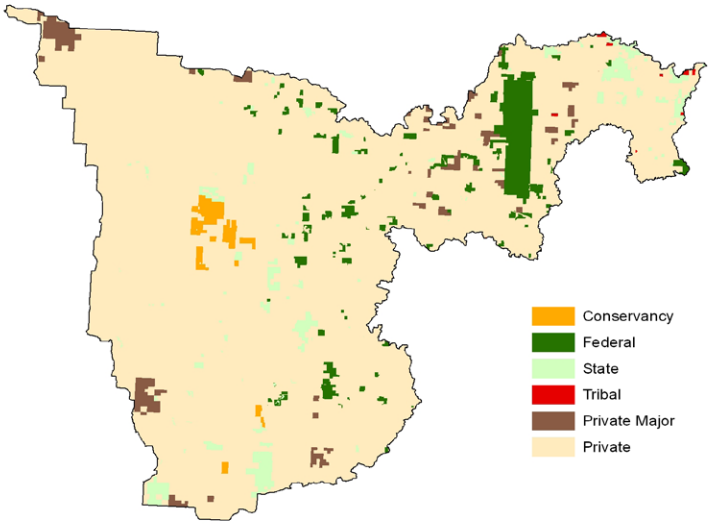


Average Precipitation



Ownership*[/1]

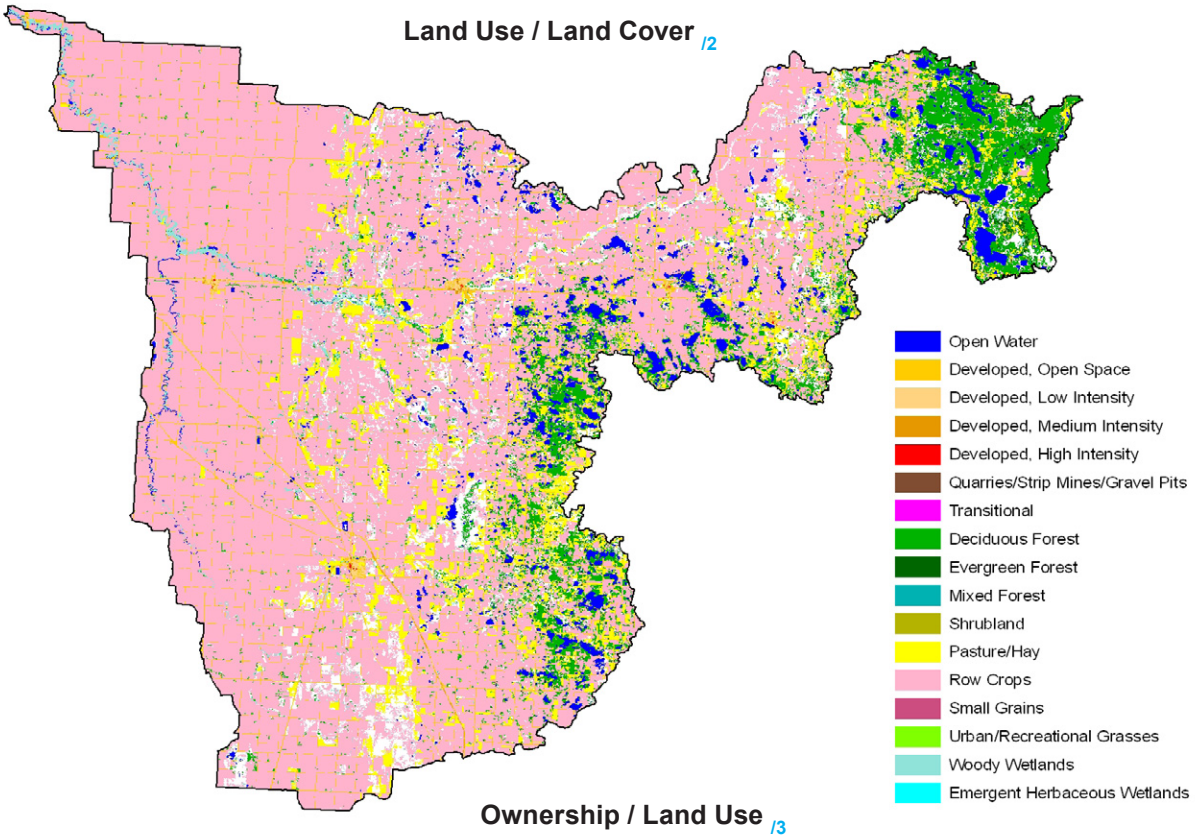
Ownership Type	Acres	% of HUC
Conservancy	6,960	1.0
County	-	-
Federal	29,658	4.2
State	20,441	2.9
Other	-	-
Tribal	599	0.1
Private Major	15,441	2.2
Private	636,301	89.7
Total Acres:	**709,400**	**100**



* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Buffalo watershed covers an area of 709,400 acres. Approximately ninety percent of the land in the watershed is owned by private landholders (636,301 acres). The second largest ownership type is Federal, with approximately 29,660 acres (4.2%), followed by State with nearly 20,450 acres (2.9%), Private-Major with 15,440 acres (2.2%), and Conservancy with 6,960 acres (1.0%). Tribal lands account for the smallest percentage, with slightly less than 600 acres (0.1%). Ownership data shows no major County land holdings in the region. Land use by ownership type is represented in the table below.



	Public		Private**		Tribal			
Landcover/Use	**Acres**	**% Public**	**Acres**	**% Private**	**Acres**	**% Tribal**	**Total Acres**	**Percent**
Forest	8,592	1.2%	53,465	7.5%	437	0.1%	62,494	8.8%
Grass, etc	5,011	0.7%	61,108	8.6%	60	0.0%	66,179	9.3%
Orchards	0	0.0%	0	0.0%	0	0.0%	0.00	0.0%
Row Crops	20,000	2.8%	452,540	63.8%	29	0.0%	472,569	66.6%
Shrub etc	167	0.0%	729	0.1%	6	0.0%	901	0.1%
Wetlands	11,655	1.6%	36,199	5.1%	5	0.0%	47,859	6.8%
Residential/Commercial	1,245	0.2%	32,692	4.6%	55	0.0%	33,992	4.8%
Open Water*	3,403	0.5%	22,017	3.1%	3	0.0%	25,423	3.6%
* ownership undetermined			** includes private-major					
Watershed Totals:	**50,073**	**7.06%**	**658,749**	**92.9%**	**595**	**0.1%**	**709,400**	**100%**

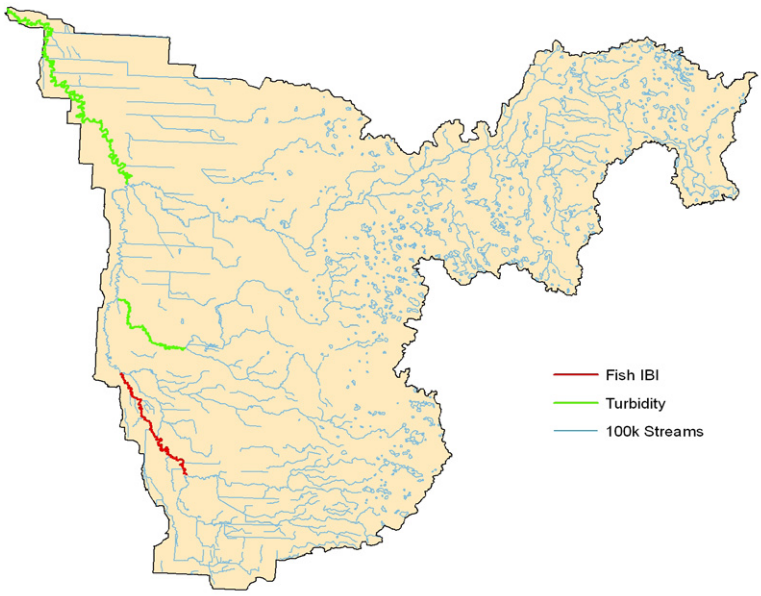
Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05062000 BUFFALO RIVER NEAR DILWORTH, MN	**2007 Avg.**	271.2	
		May – Sept. Avg.	454.5	
		ACRES/MILES	**PERCENT**	
Stream Data[4] *(*Percent of Total HUC Stream Miles)*	Total Miles – Major (100K Hydro GIS Layer)	1495	---	
	303d/TMDL Listed Streams (DEQ)	74.5	5%	
Riparian Land Cover/Land Use[5] *(Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)*	Forest	4,310	12.0%	
	Grain Crops	0	0.0%	
	Grass, etc	2,510	7.0%	
	Orchards	0	0.0%	
	Row Crops	15,124	42.1%	
	Shrub etc	35	0.1%	
	Wetlands	5,827	16.2%	
	Residential/Commercial	1,439	4.0%	
	Open Water*	6,721	18.7%	
	Total Buffer Acres:	35,966	100%	
Crop and Pastureland Land Capability Class[6] *(Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)*	**1** – slight limitations	7,100	1%	
	2 – moderate limitations	333,300	67%	
	3 – severe limitations	47,000	9%	
	4 – very severe limitations	56,500	11%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	49,000	10%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	3,800	1%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	2,700	1%	
	Total NRI Crop & Pasture Lands	**499,400**	-	
	TYPE OF LAND	**ACRES**	**% of Crop Lands**	**% of HUC**
Irrigated Lands[7] *(2002 NASS Estimates)*	**Cultivated Cropland / Pastureland**	5,285	1.1%	0.7%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	5,285	1.1%	0.7%

Assessment of Waters

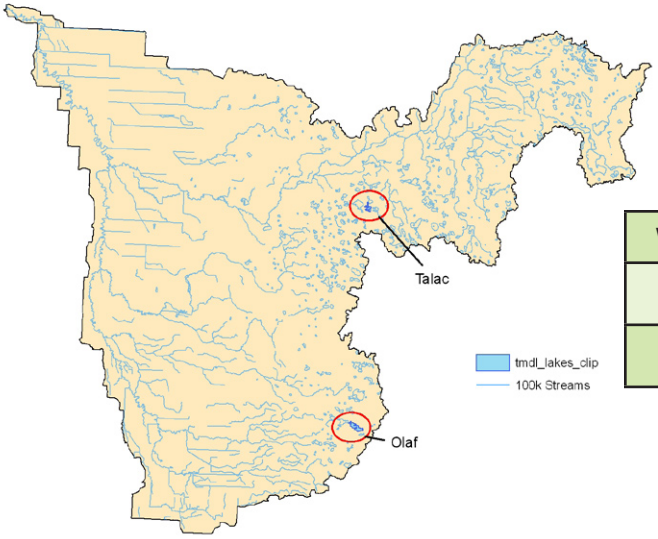
Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

2006 Minnesota 303d Listed Streams - Buffalo Watershed



Listed Stream	Impairment	Affected Use
Buffalo River S Br Buffalo R to Red R	Turbidity	Aquatic Life
Stony Creek Hay Cr to S Br Buffalo R	Turbidity	Aquatic Life
Buffalo River, South Branch Deerhorn Cr to Whiskey Cr	Fish IBI	Aquatic Life

2006 Minnesota TMDL Listed Lakes - Buffalo Watershed



Waterbody	Impairment	Affected Use
Talac	Excess nutrients, Mercury	Aquatic Recreation
Olaf	Mercury	Aquatic Consumption

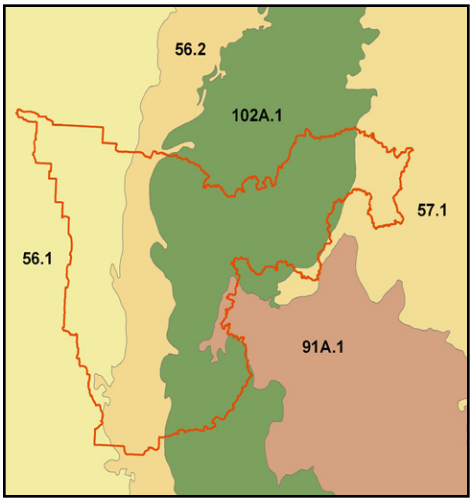
Common Resource Areas

The Buffalo Watershed encompasses five Common Resource Areas, CRA 102A.1, 91A.1, 57.1, 56.2 and 56.1. [9]

102A.1 Rolling Till Prairie: Gently sloping to steep, loamy glacial till soils with scattered sandy outwash soils and silty alluvial flood plains soils. This area is part of the Prairie Pothole region of the upper Midwest. Predominantly cropped to corn and soybeans with increasing hayland and pasture and small grains in the western part. Resource concerns are water and wind erosion, nutrient management and water quality.

91A.1 Central Minnesota Outwash: Nearly level to gently sloping well drained sandy soils on outwash plains and stream terraces. There are also numerous poorly and very poorly drained mineral and organic soils. Irrigated crop land, pasture and hayland are the major land uses. Forestland is common in parts. Corn, soybeans, edible beans and potatoes are the primary irrigated crops. Forage crops are also extensively grown. Resource concerns are wind erosion water quality, nutrient management, improperly managed grazing.

57.1 Northern Minnesota Till Moraine: Rolling glacial moraine and associated outwash with short, choppy and complex slopes. Soils are generally loamy with some clayey and sandy soils included. Organic soils occur in depressions. Land use is cropland, pasture timber and recreation. Numerous lakes occur in this region. Main crops are small grain, soybeans and forage crops. Resource concerns include improved drainage for crop production, grazing management of forest and grassland, water and wind erosion and water quality impacts.



Only the major CRA units are described.
For further information, go to:
http://soils.usda.gov/survey/geography/cra.html

56.2 Glacial Lake Agassiz Basin: This area is a complex of sandy beach material, stratified interbeach material, lacustrine silts and lake washed glacial till. Soils range from excessively drained on ridges to very poorly drained basins. Many areas have been partially drained. The main crops are small grain, soybeans and hay. Native vegetation was mixed tall and short grass prairie with scattered woodland and brush. Primary resource concerns are wind erosion, doughtiness on sandy soils and wetness in low lying and seepy areas.

56.1 Red River Valley: The Red River Valley (Glacial Lake Agassiz) is an extremely flat landscape composed of thick lacustrine sediments. Soils range from silty to clayey in texture. Most soils have a high water table and are very productive. Saline soils exist in places.Most areas are farmed with main crops being small grain, sugar beets, and soybeans. The native vegetation was tall grass prairie. Primary resource concerns are soil erosion and deposition by wind.

Geology / Soils [10]

Glacial deposits in the western portion of the watershed are glacial lake deposits of clay and silt from Glacial Lake Agassiz, and glacial lakeshore deposits of delta sand and gravel, along with areas of beach sand ridges separated by silty wetland depressions. The eastern portion of the watershed has primarily till glacial deposits made up of clay, silt, sand, gravel, cobble and boulders. Soils in the watershed vary moving from west to east from clayey soils of the lake plain at the mouth of the watershed, to black, limey, clayey soils; sandy soils; black, loamy soils; loamy soils and rolling wooded soils in the very uplands of the watershed.

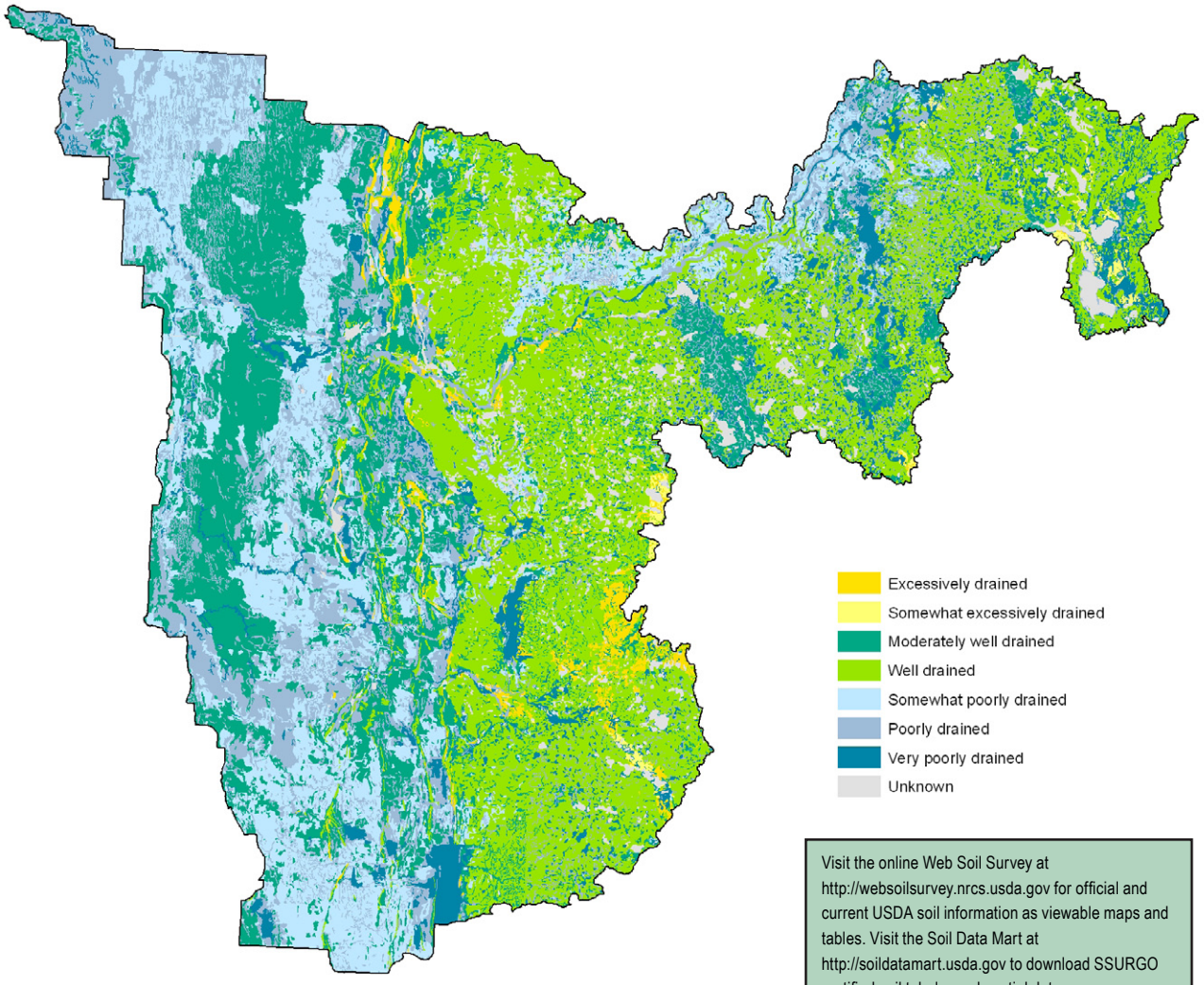
A buried sand aquifer, the Buffalo aquifer, containing large amounts of ground water underlies the watershed near its mouth. Smaller quantities of ground water are available throughout the rest of the basin.
An average of 2,700 acre-feet per year of ground water is pumped for municipal water supplies and crop irrigation. Ground water recharge occurs in the moraine area, while discharge occurs to the Red River, the Buffalo River and the glacial lake plain.

Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.

Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized–excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



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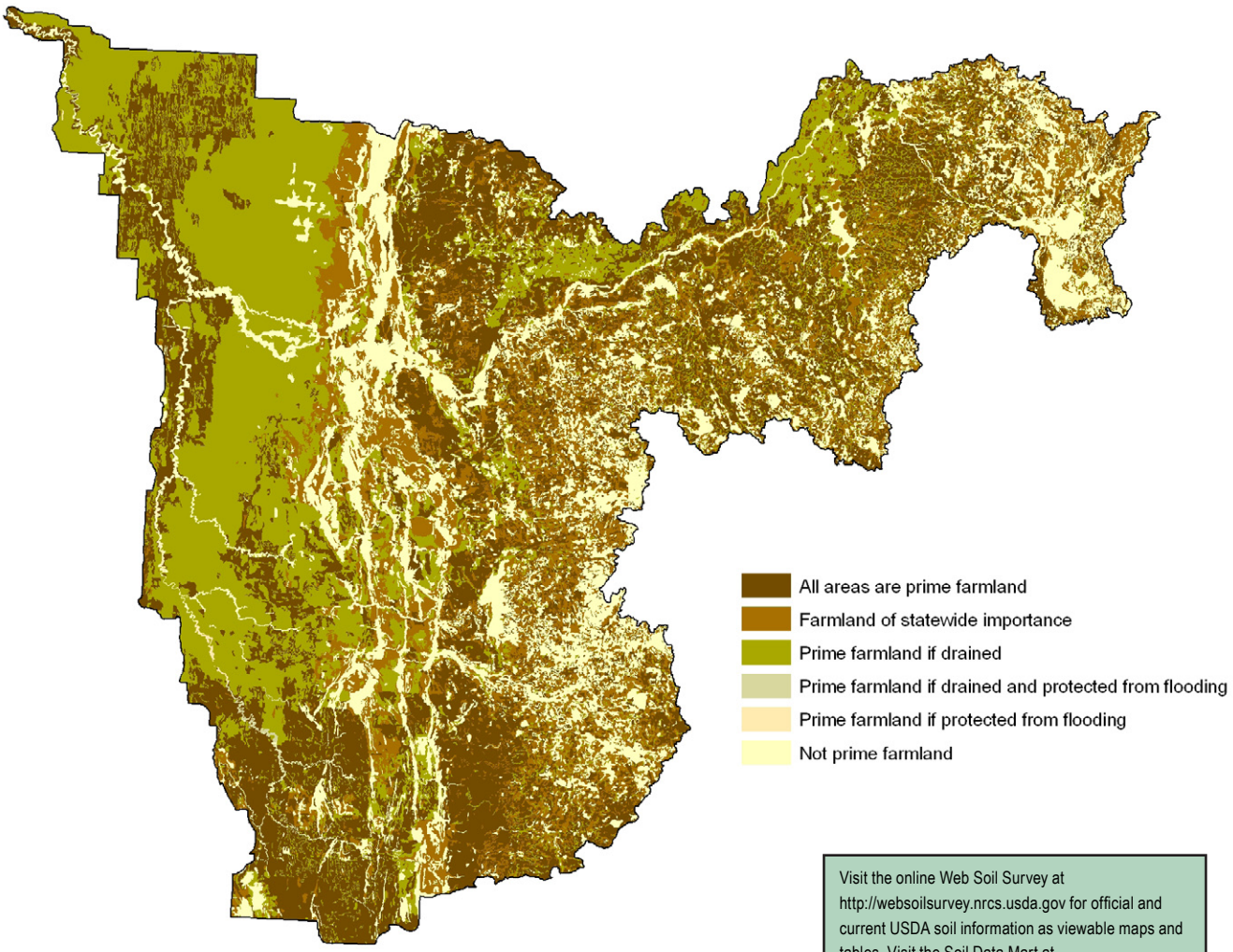
Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



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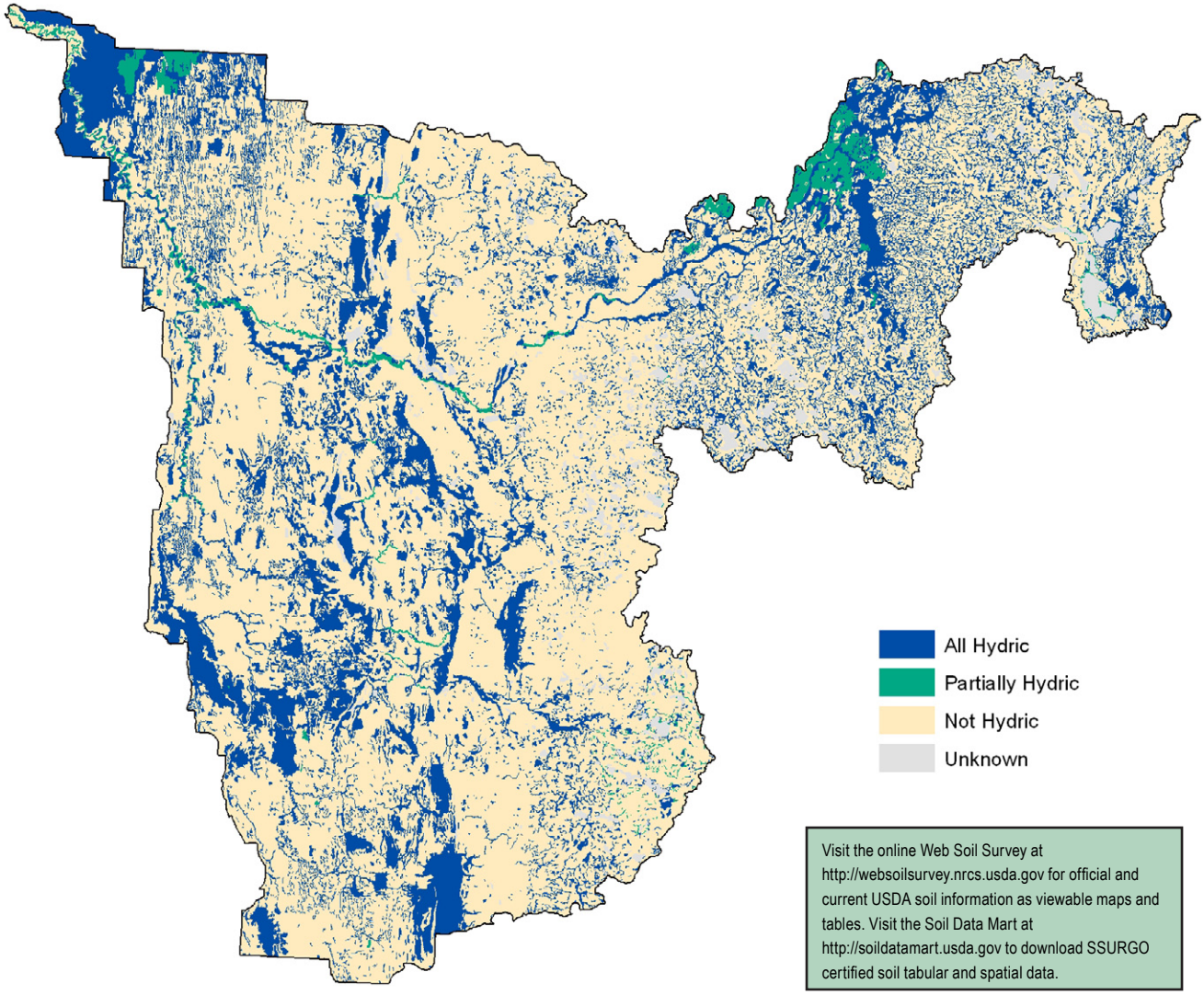
Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of non-hydric soils in the higher positions on the landform. Map units of dominantly non–hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



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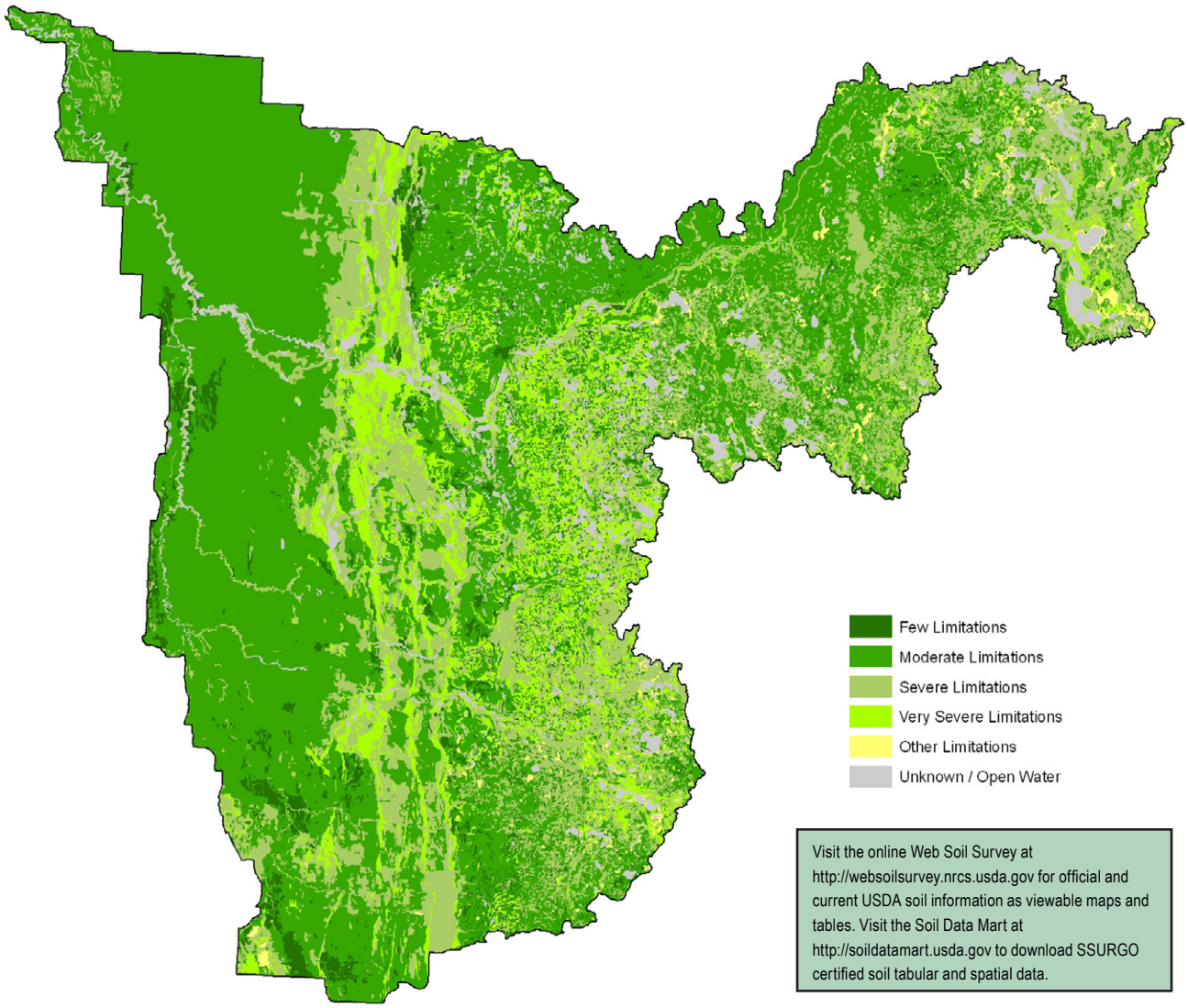
Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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Performance Results System and Other Data

Watershed Name: Buffalo				Watershed Number: 9020106						
PRS Performance Measures	**FY99**	**FY00**	**FY01**	**FY02**	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**	**TOTAL**
Total Conservation Systems Planned (acres)	8,001	9,238	0	8,803	13,544	N/A	14,860	17,168	N/A	71,614
Total Conservation Systems Applied (acres)	7,988	30,119	0	12,536	12,536	N/A	11,805	15,364	N/A	90,348
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	2	0	7	0	0	N/A	9
Riparian Forest Buffers (391) (acres)	0	245	15	56	47	24	2	5	N/A	394
Erosion Control Total Soil Saved (tons/year)	565	546,811	449,744	161,419	111,272	N/A	N/A	N/A	N/A	1,269,811
Total Nutrient Management (590) (Acres)	0	0	#N/A!	995	1,176	759	2,012	N/A	N/A	4,042
Pest Management Systems Applied (595A) (Acres)	0	0	0	215	1,006	250	250	N/A	N/A	1721
Prescribed Grazing 528a (acres)	120	1,725	130	168	157	130	130	N/A	N/A	2,560
Tree & Shrub Establishment (612) (acres)	0	472	166	61	55	67	3	N/A	N/A	674
Residue Management (329A-C) (acres)	1,800	21,407	26,053	3,891	4,466	6,789	6,789	N/A	N/A	71,195
Total Wildlife Habitat (644 - 645) (acres)	1,279	11,607	5,151	4,360	2,918	1,763	4,360	N/A	N/A	31,439
Total Wetlands Created, Restored, or Enhanced (acres)	73	177	114	180	38	400	20	N/A	N/A	1,002
Acres enrolled in Farmbill Programs[/11]										
Conservation Reserve Program	7,687	9,421	5,359	5,407	2,263	N/A	757	N/A	N/A	30,894
Wetlands Reserve Program	0	0	0	0	0	N/A	127	N/A	N/A	127
Environmental Quality Incentives Program	0	225	130	136	846	N/A	8,159	N/A	N/A	9,496
Wildlife Habitat Incentive Program	1	0	0	0	0	N/A	0	N/A	N/A	1
Farmland Protection Program	0	0	0	0	0	N/A	0	N/A	N/A	0

Socioeconomic and Agricultural Data (Relevant)

Population estimates for the Buffalo subbasin indicate that approximately 16,896 people reside in the area. Median household income throughout the district is nearly $40,700 yearly, roughly 88% of the national average. Figures show an unemployment rate of 4.2% for the basin, and approximately 10% of the residents in the watershed live below the national poverty level.

Estimates indicate there are 923 farms in the watershed. Of the 894 operators in the basin, sixty two percent are full time producers not reliant on off-farm income. Approximately forty two percent of the operations are less than 180 acres in size, forty five percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres.

	(MN) HUC# 9020106	Total Acres:	709,400
Population Data*	Watershed Population	16,896	
	Unemployment Rate	4.2%	
	Median Household Income	40,681	
	% below poverty level	10%	
	Median Value of Home	79,375	
Farm Data	# of Farms	923	
	# of Operators	894	**Percent**
	# of Full Time Operators	557	62%
	# of Part Time Operators	338	38%
	Total Cropland Acres (NASS)	**475,764**	67.1%
Farm Size	1 to 49 Acres	549	16%
	50 to 179 Acres	1,179	35%
	180 to 499 Acres	921	28%
	500 to 999 Acres	323	10%
	1,000 Acres or more	363	11%
	Average Farm Size	**170**	
Livestock & Poultry	Cattle - Beef	4,856	2%
	Cattle - Dairy	3,218	1%
	Chicken	1,039	0%
	Swine	13,158	4%
	Turkey	130,455	42%
	Other	154,719	50%
	Animal Count Total:	**307,446**	
	Total Permitted AFOs:	**152**	
Chemicals (Acres Applied)	Insecticides	40,965	
	Herbicides	265,805	
	Wormicides	3,772	
	Fruiticides	6,228	
	Total Acres Treated	**316,770**	
	% State Chemical Totals	**2.2%**	

* Adjusted by percent of HUC in the county or by percent of block group area in the HUC, depending on the level of data available

RESOURCE CONCERNS

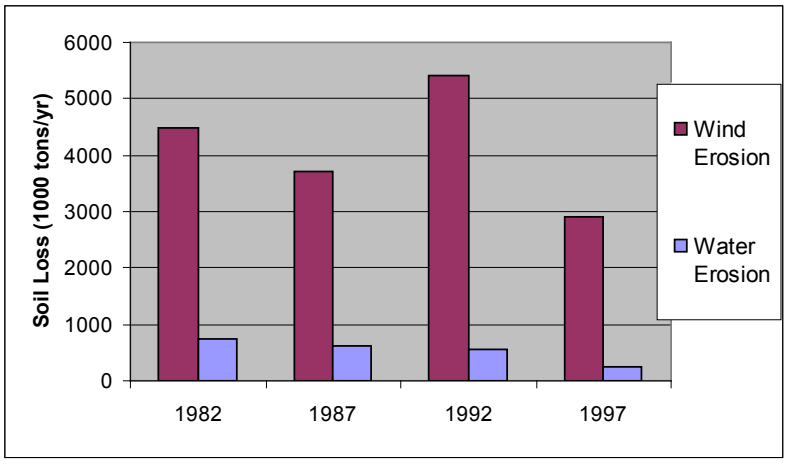
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- **Soil Quality; Excessive Sheet and Rill Erosion.** In addition to erosion on the cropland, sedimentation caused by the clearing and grading of shoreland property is neither desirable nor necessary. Erosion issues relate directly to lake pollution/eutrophication and shoreland development, and compound effects of erosion from agricultural lands.
- **Soil Quality; Excessive Wind Erosion.** Soil loss from high and constant wind is considerable, with the most recent NRI WEQ estimates exceeding 2,905,800 metric Tons of soil. Though there has been recent progress in this area, reduction of Wind erosion continues to be a pressing concern in eastern areas approaching the Red River Valley.
- **Flood Damge Reduction.** Local districts recognize that annual flood damage is a main concern. Concerns over flooding in the basin include tiling practices, drainage management, stormwater conveyence, protection of city and private sewer systems, property damage, excessive erosion and sedimentation.
- **Surface and Ground Water Quality; Nutrients, Priority Pollutants.** Reduction of priority pollutants and sediments in surface waters is a priority issue throughout the watershed. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing a fish community with depressed populations and limited diversity. Increased levels of phosphorus and chlorophyll-a are reaching area lakes as impervious surface increases and natural buffers disappear.
- **Wildlife Habitat.** Given the fragmentation caused by increased development, and agricultural land use there are few to no natural corridors of natural habitat for wildlife. Districts recognize the need for the protection and enhancement of Prairie and Wetland areas throughout the watershed.
- **Wetland Management.** Due to documented development pressures within shoreland and agricultural areas, priority should be given to preserving the wetlands within 1000 feet of a lake or 300 feet of a river. Restoration of wetlands, dam repair and placing flood-prone lands in CRP/RIM all serve to lessen the impact of flooding and sedimentation, and improve drainage.

NRI Soil Loss Estimates/13

- Sheet and rill erosion rates on crop and pasture land decreased by approximately 495,000 tons (66%) between 1982 and 1997.

- NRI estimates indicate wind erosion on crop and pasture land decreased by approximately 813,000 tons (22%) between 1982 and 1997.



THREATENED AND ENDANGERED SPECIES OF THE BASIN[14]

Scientific Name	Common Name	Type
Ammodramus henslowii	Henslow's Sparrow	Zoological
Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow	Zoological
Botrychium campestre	Prairie Moonwort	Botanical
Botrychium simplex	Least Moonwort	Botanical
Buteo lineatus	Red-shouldered Hawk	Zoological
Calamagrostis montanensis	Plains Reedgrass	Botanical
Calcarius ornatus	Chestnut-collared Longspur	Zoological
Carex hallii	Hall's Sedge	Botanical
Carex scirpoidea	Northern Singlespike Sedge	Botanical
Carex sterilis	Sterile Sedge	Botanical
Cirsium hillii	Hill's Thistle	Botanical
Coturnicops noveboracensis	Yellow Rail	Zoological
Cygnus buccinator	Trumpeter Swan	Zoological
Cypripedium candidum	Small White Lady's-slipper	Botanical
Eleocharis quinqueflora	Few-flowered Spike-rush	Botanical
Fimbristylis puberula var. interior	Hairy Fimbristylis	Botanical
Gaillardia aristata	Blanket-flower	Botanical
Gentiana affinis	Northern Gentian	Botanical
Gentianella amarella ssp. acuta	Felwort	Botanical
Haliaeetus leucocephalus	Bald Eagle	Zoological
Helianthus nuttallii ssp. rydbergii	Nuttall's Sunflower	Botanical
Helictotrichon hookeri	Oat-grass	Botanical
Hesperia comma assiniboia	Assiniboia Skipper	Zoological
Hesperia dacotae	Dakota Skipper	Zoological
Heterodon nasicus	Western Hognose Snake	Zoological
Lanius ludovicianus	Loggerhead Shrike	Zoological
Lasmigona compressa	Creek Heelsplitter	Zoological
Ligumia recta	Black Sandshell	Zoological
Limosa fedoa	Marbled Godwit	Zoological
Microtus ochrogaster	Prairie Vole	Zoological
Oarisma powesheik	Powesheik Skipper	Zoological
Oeneis uhleri varuna	Uhler's Arctic	Zoological
Orobanche fasciculata	Clustered Broomrape	Botanical
Orobanche ludoviciana	Louisiana Broomrape	Botanical
Panax quinquefolius	American Ginseng	Botanical
Perognathus flavescens	Plains Pocket Mouse	Zoological
Phalaropus tricolor	Wilson's Phalarope	Zoological
Platanthera praeclara	Western Prairie Fringed Orchid	Botanical
Rhynchospora capillacea	Hair-like Beak-rush	Botanical
Ruppia maritima	Widgeon-grass	Botanical
Scleria verticillata	Whorled Nut-rush	Botanical
Silene drummondii	Drummond's Campion	Botanical
Speotyto cunicularia	Burrowing Owl	Zoological
Speyeria idalia	Regal Fritillary	Zoological
Trimorpha lonchophylla	Shortray Fleabane	Botanical
Tympanuchus cupido	Greater Prairie-chicken	Zoological

Watershed Projects, Plans and Monitoring

- **Manston Slough Clean Water Pilot Project**
  Buffalo-Red River Watershed District
- **Turtle Lake Outlet - Project 46**
  Buffalo-Red River WS District, MN DNR
- **Oakport Flood Mitigation Project**
  US Army COE, BRRWD, DNR, Oakport, Moorhead
- **Whiskey Creek Watershed Project**
  Wilkin County SWCD
- **International Trans-boundary Case Study**
  Red River Basin Commission
- **Aggassiz Basin White Pine Restoration**
  Minnesota Civilian Conservation Corps
- **Red River Basin Riparian Project**
  Red River RC&D
- **Red River Water Management Consortium**
  USDA, UND EERC, Red River Basin Citizens
- **Red River Basin Water Quality Work Plan**
  Minnesota Pollution Control Agency
- **Red River Valley Water Supply Project**
  Red River International Joint Commission
- **Red River Basin Water Quality Monitoring Project**
  Red River Basin Commission
- **USGS Sediment to Streams Study - Red River Basin**
  USGS, Minnesota Pollution Control Agency

*** Have a watershed project you'd like to see included? Submit suggestions online @ http://www.mn.nrcs.usda.gov/technical/rwa/**

Conservation Districts, Organizations & Partners

- **Becker County SWCD**
  809 - 8th St SE, Detroit Lakes, MN 56501
  Phone (218) 846-7360
- **Buffalo-Red River Watershed District**
  123 Front St S Barnesville, MN 56514
  Phone (218) 354-7710
- **Clay County SWCD**
  1615 30th Ave S, Moorhead, MN 56560
  Phone (218) 287-2255
- **MN DNR Area Fisheries Supervisor:**
  1509 1st Ave N Fergus Falls, MN 56537
  Phone (218) 739-7576
- **North Central Minnesota Joint Powers Board**
  3217 Bemidji Ave N Suite 3 Bemidji, MN 56601
  Phone (218) 755-4339
- **Ottertail County SWCD, East**
  801 Jenny Ave SW Ste 2, Perham, MN 56573
  Phone (218) 346-4260
- **Ottertail Co Coalition of Lake Associations**
  PO Box 53 Ottertail, MN, 56571
  Phone (218) 736-4021
- **Red River Basin Commission**
  119th 5th St. P.O. Box 66 Moorhead, MN 56561
  www.redriverbasincommission.org
- **Red River RC&D**
  516 cooper Ave, Suite 101 Grafton, ND 58237
  Phone (701) 352-0127
- **Red River Basin Riparian Project**
  516 Cooper Ave Grafton, ND 58237
  Phone (701) 352-3550
- **Wilkin County SWCD**
  1150 Hwy 75 N, Breckenridge, MN 56520
  (218) 643-2933
- **Trout Unlimited Twin Cities Chapter**
  PO Box 390207
  Edina, MN 55439-0207

Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is varable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.

2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.

3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff.Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.

4. USGS 1:100,000 Hydrography Layer .This data set represents all features coded as 'rivers' on the USGS 1:100,000-scale DLG Hydrography data set. This current version was converted to ARC/INFO by the Land Management Information Center and edge-matched across map sheet boundaries. Minnesota DNR made further modifications to the files, verified lake feature identifiers, and created a state layer from the separate 100k data. The Hydro 100k layer was compared to MPCA's 303(d) data to derive percentage of listed waters.

5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.

6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: http://www.nrcs.usda.gov/technical/NRI/

7. 2002 NASS Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. For more information: http://www.agcensus.usda.gov/

8. 303(d) Stream data. Minnesota's Final Impaired Waters (per Section 303(d) Clean Water Act), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. http://www.pca.state.mn.us/water/tmdl/index.html#maps.

Footnotes / Bibliography (continued)

9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at http://soildatamart.nrcs.gov. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm (7/30/04). CREP Acres: http://www.bwsr.state.mn.us/easements/crep/easementsummary.html (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Unemployment statistics obtained from the Bureau of Labor Statistics - Labor Force Data by County, 2006 Annual Averages http://www.bls.gov Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. http://www.nrcs.usda.gov/Technical/efotg/. Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 http://www.nmfs.noaa.gov/sfa/magact/

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, http://www.nrcs.usda.gov/programs/watershed/Purpose.